



## **Five-Year Review Report**

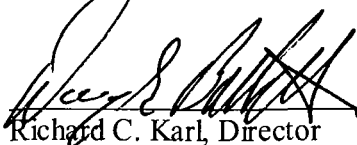
### **Second Five-Year Review Report for Ormet Corp. Superfund Site Monroe County, Ohio**

**May 2007**

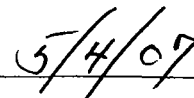
Prepared by:  
**United States Environmental Protection Agency  
Region 5  
Chicago, Illinois**

Approved by:

Date:



*for* Richard C. Karl, Director  
Superfund Division  
U.S. EPA, Region 5



[This page intentionally left blank.]

## Table of Contents

List of Acronyms .....	v
Executive Summary .....	vii
Five-Year Review Summary Form .....	ix
<b>I. Introduction .....</b>	<b>1</b>
<b>II. Site Chronology .....</b>	<b>1</b>
<b>III. Background .....</b>	<b>2</b>
Physical Characteristics	
Land and Resource Use	
History of Contamination	
Initial Response	
Basis for Taking Action	
<b>IV. Remedial Action .....</b>	<b>7</b>
Remedy Selection	
Remedy Implementation	
Institutional Controls	
System Operation and Operation and Maintenance	
<b>V. Progress Since the Last Five-Year Review .....</b>	<b>12</b>
<b>VI. Five-Year Review Process .....</b>	<b>16</b>
Administrative Component	
Community Notification and Involvement	
Document Review	
Data Review	
Site Inspection	
<b>VII. Technical Assessment .....</b>	<b>17</b>
<u>Question A. Is the remedy functioning as intended by the decision documents?</u>	
<u>Question B. Are the exposure assumptions, toxicity data, clean-up levels, and remedial</u>	
<u>action objectives used at the time of the remedy selection still valid?</u>	
<u>Question C. Has any other information come to light that could call into question the</u>	
<u>protectiveness of the remedy?</u>	
<u>Technical Assessment Summary</u>	
<b>VIII. Issues .....</b>	<b>19</b>
<b>IX. Recommendations and Follow-Up Actions .....</b>	<b>19</b>
<b>X. Protectiveness Statement .....</b>	<b>20</b>
<b>XI. Next Review .....</b>	<b>20</b>
<b>Table</b>	
Table 1. Clean-up Standards for Chemicals of Concern in Groundwater	5
<b>Figure</b>	
Figure 1. Base Map .....	21
Figure 2. Fluoride Isopleth Map .....	22
Figure 3. Ad Announcing Review .....	23

[This page intentionally left blank.]

## List of Acronyms

ARARs	applicable or relevant and appropriate requirements
CFR	Code of Federal Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cis-1,2-DCE	cis-1,2-dichloroethene
CMSD	construction materials scrap dump
CRDA	carbon runoff and deposition area
ESD	Explanation of Significant Difference
FDP	former disposal pond
FS	feasibility study
FSPSA	former spent potliner storage area
HRL	health risk limit
IC	institutional control
MCL	maximum contaminant level
msl	mean sea level
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
Ohio EPA	Ohio Environmental Protection Agency
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethylene (perchloroethylene)
PRP	potentially responsible party
RA	remedial action
RCRA	Resource Conservation Recovery Act
RD	remedial design
RI	remedial investigation
ROD	Record of Decision
SMCL	secondary maximum contaminant level
SVOC	semi-volatile organic compound
TCE	trichloroethene
TSCA	Toxic Substances Control Act
UECA	Uniform Environmental Covenants Act
U. S. EPA	United States Environmental Protection Agency
UU/UE	unlimited use or unrestricted exposure
VOC	volatile organic compound

[This page intentionally left blank.]

## **Executive Summary**

The Ormet Corp. Superfund Site (Site) comprises the eastern portion of the Ormet reduction plant property located outside Hannibal, Monroe County, Ohio. Plant wastes were historically disposed of on the ground or in unlined lagoons in this area. The remedy for the Site included continued operation of the interceptor wells and groundwater treatment system for remediation of groundwater to specified cleanup standards; the continued pumping of the Ranney well in conjunction with pumping of the interceptor wells for plume containment; construction and operation of a soil flushing system in the former spent potliner storage area to remove contaminants contributing to the groundwater contamination; construction of a landfill and a Toxic Substances Control Act (TSCA) cell at the construction materials scrap dump (CMSD); construction of a means for collecting the leachate at the CMSD landfill and a pre-treatment system for its treatment and subsequent operation of the system; removal of contaminated soils and sediments from the carbon runoff and deposition area (CRDA) and the outfall 4 stream backwater area and placement of the removed materials in the CMSD landfill or the TSCA cell within it; fencing; maintenance of the remedial components; and deed restrictions prohibiting potable use of groundwater and residential use of the Site. The Site achieved construction completion with the signing of the Preliminary Close Out Report on August 4, 1998. The trigger for this review was the signing of the first Five-Year Review Report on May 6, 2002.

The assessment of this five-year review is that the remedy was constructed in accordance with the Record of Decision (ROD) and the Explanation of Significant Differences. The remedy is functioning as anticipated, except that restrictions on groundwater use are not as extensive as the ROD anticipated. The remedy is protective of human health and the environment in the short term. Exposure pathways that could result in unacceptable risks are being controlled and deed restrictions, in conjunction with the continued operation by Ormet of the reduction plant, are currently preventing exposure to, or the ingestion of, contaminated groundwater. Threats at the Site have been addressed through capping, excavation, soil flushing, plume containment, groundwater pump-and-treat, installation of fencing, and the implementation of institutional controls. The remedy will be protective in the long term once effective institutional controls preventing potable use of contaminated groundwater have been expanded to cover the entire reduction plant property.

[This page intentionally left blank.]

## Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name (from <i>WasteLAN</i> ): Ormet Corp.		
EPA ID (from <i>WasteLAN</i> ): OHD004379970		
Region: 5	State: OH	City/County: --/Monroe County
SITE STATUS		
NPL status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify) _____		
Remediation status (choose all that apply): <input type="checkbox"/> Under construction <input checked="" type="checkbox"/> Operating <input type="checkbox"/> Complete		
Multiple OUs?* <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Construction completion date: 8/04/98	
Has Site been put into reuse? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (operating manufacturing plant)		
REVIEW STATUS		
Lead Agency: <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency _____		
Author name: Bernard J. Schorle		
Author title: Remedial Project Manager	Author affiliation: U. S. EPA, Region 5	
Review period:** 5/02 to 3/07		
Date(s) of Site inspection: 11/08/06		
Type of review: <input checked="" type="checkbox"/> Post-SARA	<input type="checkbox"/> Pre-SARA	
<input type="checkbox"/> Non-NPL remedial action site	<input type="checkbox"/> NPL State/Tribe-lead	
<input type="checkbox"/> Regional discretion	<input type="checkbox"/> NPL-removal only	
Review number: <input type="checkbox"/> 1 (first) <input checked="" type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify) _____		
Triggering action:		
<input type="checkbox"/> Actual RA on-site construction at OU # _____	<input type="checkbox"/> Actual RA start at OU # _____	
<input type="checkbox"/> Construction completion	<input checked="" type="checkbox"/> Previous five-year review report	
<input type="checkbox"/> Other (specify) _____		
Triggering action date (from <i>WasteLAN</i> ): 5/06/02		Due date: 5/06/07

\*--"OU" refers to operable unit

\*\*—Review period should correspond to the actual start and end dates of the five-year review in *WasteLAN*

### Issues:

1. The CMSD landfill cover needs to be repaired and its maintenance needs to be improved.
2. The fluoride concentrations in the plume near FDP-5 have increased recently.
3. The existing deed restriction covers only the Site property. It does not limit exposure to the contaminated groundwater located under the manufacturing portion of the facility or protect remedy components located on that portion of the facility.

### Recommendations and Follow-Up Actions:

1. The failed portion of the CMSD landfill cover is scheduled for repair. The procedures for the maintenance of the cover included in the specifications for the cover repair need to be implemented.
2. The results from the groundwater monitoring downgradient from FDP-5 will continue to be followed closely to see what effect FDP-5 might be having on the groundwater contamination, if any.
3. An IC Plan will be developed providing milestone dates for implementing a new UECA environmental covenant for the entire Hannibal reduction facility.

**Protectiveness Statement:**

The remedy is protective of human health and the environment in the short term. Exposure pathways that could result in unacceptable risks are being controlled and deed restrictions, in conjunction with the continued operation by Ormet of the reduction plant, are currently preventing exposure to, or the ingestion of, contaminated groundwater. Threats at the Site have been addressed through capping, excavation, soil flushing, plume containment, groundwater pump-and-treat, installation of fencing, and the implementation of institutional controls. The remedy will be protective in the long term once effective institutional controls preventing potable use of contaminated groundwater have been expanded to cover the entire reduction plant property.

[This page intentionally left blank.]

**Ormet Corp. Superfund Site  
Hannibal, Monroe County, Ohio  
Second Five-Year Review Report**

**I. Introduction**

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in a five-year review report. In addition, the five-year review report identifies issues found during the review, if any, and identifies recommendations to address them.

The Agency is preparing this five-year review report pursuant to Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Contingency Plan (NCP) (40 Code of Federal Regulations (CFR) Part 300). CERCLA §121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section 104 or 106, the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The United States Environmental Protection Agency (U. S. EPA), Region 5, which is the lead agency for the Site, has conducted the five-year review of the remedy implemented at the Ormet Corp. Superfund Site in Hannibal, Ohio. This review was conducted for the entire Site by the remedial project manager (RPM) for the period from March 2002 through March 2007. This report documents the results of the review.

This is the second five-year review for the Ormet Site. The triggering action for this statutory review is the signature date of the first Five-Year Review Report on May 6, 2002. The five-year review is required because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

**II. Site Chronology**

<b>Event</b>	<b>Date</b>
Plant started operations	1958
Placement of spent potliner in former spent potliner storage area (FSPSA)	1958 to 1968
Use of retention disposal ponds (former disposal ponds--FDPs)	1958 to 1981

<b>Event</b>	<b>Date</b>
Wastes to construction materials scrap dump (CMSD)	1966 to mid 1979
Removal of much of the spent potliner	1968 to 1981
Verification of groundwater contamination in the Ranney well at the reduction plant and subsequent installation of interceptor wells	about 1972
Proposed to National Priority List (NPL)	9/18/85
Placed as final on NPL	7/21/87
Administrative Order by Consent between Ormet Corporation, Ohio Environmental Protection Agency (Ohio EPA), and U.S. Environmental Protection Agency (U. S. EPA) for Ormet to perform the remedial investigation (RI) and feasibility study (FS), reported effective date	5/19/87
Remedial Investigation Report	12/29/92
Feasibility Study Report including Addendum required by U. S. EPA	December 1993
Proposed Plan	Undated, reportedly released 4/11/94
Public meeting for the Proposed Plan, FS Report, RI Report, and other documents	4/20/94
End of comment period for the Proposed Plan	6/10/94
Record of Decision (ROD)	9/12/94
Consent Decree for remedial design and remedial action between Ormet Primary Aluminum Corporation and U. S. EPA	Lodged 9/28/95 Entered 12/18/95
Explanation of Significant Differences (ESD)	4/1/97
Approval of design	4/15/97
Preliminary Close Out Report signifying construction completion	8/4/98
First Five-Year Review Report	5/6/02
Discovered part of CMSD landfill cover had failed and slid down the side	6/13/06

### **III. Background**

#### **Physical Characteristics**

The Ormet Corp. Superfund Site (Site) comprises the northeast portion of the Ormet Primary Aluminum Corporation reduction plant facility located in Monroe County, Ohio, approximately 3 miles north of the city of Hannibal in the southeastern part of the state. The Ormet reduction plant produces aluminum. Plant wastes were historically disposed of on the ground or in unlined lagoons in this area (see more detailed description of the Site below). The reduction plant is located along the Ohio River at approximately rivermile 123, about 35 miles south of Wheeling, West Virginia. The facility is bounded on the northwest by Ohio State route 7 and on the east and southeast by the Ohio River. Located to the west of the reduction plant property is the former Consolidated Aluminum Corporation rolling mill, now owned by Ormet; the rolling mill has been shut down and much of the equipment has been sold.

#### **Land and Resource Use**

Since the reduction plant started operations in 1958, the main process has been the reduction of alumina to produce aluminum metal, and the plant is producing aluminum from alumina at the present time.

The alluvial aquifer beneath the surface of the reduction plant was a source of both process and drinking water for the reduction plant and the rolling mill until the rolling mill was shut down in 2005. Prior to 2005, two high capacity Ranney wells, one on the reduction plant's property and the other on the rolling mill's property pumped close to 4 million gallons per day. Water from the rolling mill's Ranney well was used for drinking water by both plants. The reduction plant's Ranney well was, and continues to be, used to provide non-contact cooling water, presently producing about 1.5 to 2.0 million gallons per day. Since the shut down of the rolling mill, its Ranney well has not been pumped. The reduction plant now obtains its drinking water from a public water supply. Ormet has stated its intention is to implement deed restrictions on the rolling mill property which will absolutely prohibit all use of groundwater beneath the rolling mill property.

### **History of Contamination**

From 1958 to 1968, spent potliner, a hazardous by-product of the aluminum production, was placed in an unlined open area in the northeast area of the Site, which is referred to as the former spent potliner storage area (FSPSA). (Many of these areas are shown in Figure 1, which shows the monitoring wells.) From 1968 to 1981, much of the potliner waste was removed and transported to an on-site recovery plant that removed a useable material called cryolite from the potliner. A waste slurry from the cryolite recovery plant was routed to former disposal pond (FDP) No. 5; FDPs 1 through 4 may have received minor amounts of cryolite plant waste. These tailings were alkaline and consisted primarily of carbonaceous material from the potliner along with sodium and calcium-based salts. Since 1980, the remaining potliner material has been transported off site for disposal.

At various times from 1958 to 1981, one or more retention disposal ponds were used. These are the five former disposal ponds mentioned above, which are unlined and constructed of natural materials. Primarily, ponds 1 through 4 were used for the disposal of process wastes from the air emissions wet scrubbing system in the form of a sludge, the primary constituents of which were alumina, particle carbon, and calcium-based salts.

From about 1966 until mid 1979, Ormet deposited waste construction materials and other miscellaneous plant debris in the southeastern corner of the Ormet property, adjacent to pond 5. This 4 to 5 acre area is designated the construction materials scrap dump (CMSD). An area referred to as the carbon runoff and deposition area (CRDA) contained carbon deposits, probably carried there by storm water runoff from the Ormet plant area. Some of the carbon runoff may also have entered the 004 outfall stream and backwater area.

### **Initial Responses**

In 1972, a hydrogeologic study verified the presence of groundwater contamination in the Ranney well pumping center at the reduction plant. As a result of this study, two interceptor wells (#1 and #2) were installed north of this Ranney well to intercept the plume before it reached the pumping center. The waste disposal areas on the reduction plant were the sources of the groundwater plume, which extended about 3,000 feet southwest from these sources until it reached the interceptor wells. Although the groundwater underneath the reduction plant was not used for

drinking water, the aquifer was being used for drinking water at the rolling mill. The rolling mill Ranney well was located about 2,000 feet to the west of the reduction plant's Ranney well, and provided drinking water to about 3,200 employees of both plants. The contamination at the reduction plant source areas, combined with its potential impact on downgradient drinking water supplies, prompted U. S. EPA to propose that the Site be placed on the National Priorities List (NPL) in September 1985. In May 1987, the U. S. EPA, Ohio Environmental Protection Agency (Ohio EPA), and Ormet Corporation entered into an Administrative Order by Consent (Consent Order) providing for Ormet to conduct a remedial investigation (RI) and feasibility study (FS) under the oversight of U. S. EPA and Ohio EPA. The remedial investigation report was completed in December 1992 and the feasibility study report was completed in December 1993. In addition to defining the contamination found in the disposal areas described above, during the remedial investigation seeps were discovered near the plant recreational area ballfields and along the western edge of the CMSD. The seeps contained cyanide ranging in concentrations to 950 ppb.

The Superfund Site is to the east of the reduction plant manufacturing facilities, called the Ormet plant proper on Figure 1. On this figure there is a line (fence) that runs near wells MW-3 near the south end and MW-28 near the north end that is the western border of the Superfund Site, except that FDP No. 1 and FDP No. 2 are also part of the Site. FSPSA, FDP No. 3, FDP No. 4, FDP No. 5, CMSD, and CRDA are included in the Site.

The discussion in the rest of this section covers what was found during the remedial investigation. Cyanide, fluoride, chromium, arsenic, and polynuclear aromatic hydrocarbons (PAHs) were found in solids from the FDPs. The contaminants did not appear to be migrating to any significant degree, either to groundwater or air, except that fluoride was present in groundwater downgradient of FDP-5 at levels that exceeded the maximum contaminant level (MCL). A comparison with sample results from 1972 showed that fluoride concentrations downgradient of FDP-5 had decreased by one to three orders of magnitude at a given sampling location. Pond solids were found to be characteristically alkaline in nature and no evidence was found of surface runoff from the ponds.

At the FSPSA, relatively high concentrations of PAHs were detected in soils in the 2 to 4 foot horizon. Because PAHs are relatively immobile, they were not expected to contribute significantly to releases to groundwater from the FSPSA. Moderate levels of cyanide and arsenic, both mobile in groundwater, were identified in the FSPSA. The FSPSA was found to be the primary contributor to cyanide and fluoride contamination in groundwater, and may also be a factor in the arsenic showing up in downgradient wells. In contrast to the situation at FDP-5, fluoride levels in and downgradient of the FSPSA were found to have shown an increasing trend since 1972.

The CRDA is underlain by moderate to low-permeability soils. A single composite sample from the CRDA showed polychlorinated biphenyls (PCBs) at 56 mg/kg. The CRDA was thought to be a probable source of PCBs and PAHs to the backwater and river bank, transported by storm water runoff. Arsenic was also detected as high as 83 mg/kg in soils at the CRDA.

The CMSD was found to be a significant source of cyanide and PCBs in the seeps, backwater sediments, and river water. The principal transport mechanism appeared to be the discharge of

seep water to the 004 outfall stream. A low-permeability clay/silt layer was found underneath the CMSD which appeared to provide a natural barrier to contaminants leaching to groundwater, and the reduction plant's Ranney well creates a hydraulic gradient away from the river, so groundwater discharge to surface water is not considered a reasonable migration pathway. PAHs were found at levels that contributed to an increased ecological risk but were not believed to be migrating out of the source area.

Groundwater at the Site was found to be contaminated in excess of MCLs for a number of contaminants, including tetrachloroethene (PCE), cyanide, fluoride, arsenic, antimony, and beryllium. The primary source of the plume appeared to be infiltration of precipitation through the FSPSA. The plume extended about 3,000 feet from the FSPSA before it reached the interceptor wells. It was characterized by a basic pH near the FSPSA, which became progressively more neutral with distance from the source. Sodium was also typically elevated in the plume. Table 1, taken from the 1994 Record of Decision, shows the ranges of concentrations as well as the clean-up standards specified for chemicals of concern in groundwater at the Site.

Table 1. Clean-up Standards for Chemicals of Concern in Groundwater

Chemicals of Concern for Groundwater	Concentration Range (µg/l)	Clean-up Standard (µg/l)
tetrachloroethene	5.0--40	5 <sup>a</sup>
arsenic	1.8--394	10 <sup>b</sup>
beryllium	0.25--35	4 <sup>a</sup>
cyanide	11.0--18,600	200 <sup>a</sup>
manganese <sup>c</sup>	ND--15,400	230 <sup>c,d</sup>
vanadium	2.6--369	260 <sup>a</sup>
fluoride	100--710,000	4000 <sup>a</sup>

a. maximum contaminant level (MCL) or proposed MCL; for cyanide, the value is the concentration of cyanide amenable to chlorination, not total cyanide

b. analytical quantitation limit (greater than background); background, however, has not been firmly established

c. risk based

d. background

e. This is an interim standard for manganese, based on background determined during the risk assessment; further analysis is to be performed to determine what background should be.

A small backwater area at the mouth of the 004 outfall stream created a sink for contamination. PCBs at nearly 100 ppm and total PAHs at over 1100 ppm were identified in the sediments.

Although industrial activity upstream from the Site contributed a certain level of contamination to the Ohio River water and sediments as they reached the Site, some effects from the Site were found in both media. The effects were mainly in the form of elevated pH and concentrations of PAHs, PCBs, and cyanide. Because the two Ranney wells make the river a losing stream in this stretch, storm water runoff and seep discharge were found to be the most likely transport mechanisms to the river.

The risk characterization for the baseline risk assessment for human health that was performed during the remedial investigation indicated that estimated risks were greatest under a future resi-

dential land use scenario that included direct contact with and ingestion of contaminated soils and sediments, inhalation of particulate matter, ingestion of contaminated groundwater, and ingestion of fish contaminated with polychlorinated biphenyls (PCBs) from the Site. A significant area of controversy concerning the Site at the time the remedy was selected was the question of whether future residential development of the Site was a likely use, and therefore whether residential use was a reasonable scenario on which to base the selection of the remedy. The Site was part of an active manufacturing facility in a rural area next to another manufacturing facility; this adjacent facility is now also owned by the Ormet Corporation but is not now being used for manufacturing. There were no residences in the immediate area, and Monroe County census figures indicated a 10% decrease in population in the previous 8 years. As a result, U. S. EPA believed it was reasonable to assume that the current land use would continue for the foreseeable future and that residential development of the Site would be highly unlikely. Therefore, the selected remedy was based on cleaning up to standards based on future commercial or industrial use of the property. However, U. S. EPA believed it was also reasonable to assume that at some time in the future the Ranney well at the reduction plant might no longer be used, in which case containment of the plume would be lost and contamination might reach the Ranney well at the rolling mill which, at the time, supplied drinking water. Therefore, the remedy selected included the restoration of the groundwater to drinking water quality.

The environmental evaluation performed for the Site for the remedial investigation concluded that the contaminants of concern (many more substances than the seven listed in the table above) from an ecological standpoint were known to produce sublethal and other toxic effects in the types of organisms found on the Site. Sediments from the southwestern CMSD seeps and the backwater area produced high mortality among bioassay organisms. Surface water in the backwater area and immediately downstream exceeded the four-day average ambient water quality criteria (AWQC) for antimony, lead, cyanide, and PCBs. Cyanide at two locations exceeded the one-hour average criterion. This demonstrated that the Site's contaminants in river water could potentially cause lethal and sublethal effects in aquatic organisms. In addition, concentrations of contaminants in river sediments were compared to reference sites (relatively clean) and sites with a high occurrence of tumors in fish. Sediments on-site and downstream of the Site exceeded the lowest concentrations for PCBs and PAHs observed at the fish tumor sites. Backwater area PAH concentrations exceeded the highest levels reported from the fish tumor sites, indicating the backwater area was likely to pose severe carcinogenic risk to fish entering from the Ohio River due to exposure to PCBs and PAHs in sediments. The CMSD and the CRDA were considered the likely sources for PCBs and PAHs in the backwater area sediments and the river.

### **Basis for Taking Action**

The backwater area sediments posed a current threat to human health and the environment and were to be addressed by the remedy specified in the Record of Decision (ROD). The CRDA and CMSD, while not posing unacceptable risks themselves, were sources of contamination for the sediments and were to be addressed by the remedy. The FSPSA and groundwater contamination were to be addressed because the aquifer was, at the time, a source of drinking water, and under a future scenario where the reduction plant's Ranney well would cease pumping, the drinking water well at the rolling mill could become contaminated.

The former disposal ponds were carried through the feasibility study because under the future residential use risk assessment they presented an unacceptable risk. It was later decided that future residential use of this area was an unlikely scenario. Under none of the current use scenarios did these ponds contribute any significant risk. Estimated risk under future industrial use fell within the acceptable risk range. While FDP-5 appeared to be a source of elevated fluoride in the groundwater, data from the previous 20 years indicated a steady decrease in fluoride levels downgradient of FDP-5 due to the pumping of the interceptor wells and the Ranney well at the reduction plant. It was thought to be reasonable that this trend would continue and that Site-wide groundwater monitoring during remedial action would provide a basis for determining whether the downward trend was continuing. Therefore, the ROD stated, "...these areas will not require active remedial action, and will not be considered further in this decision document." Although the ROD later says that the no action alternative was being selected for the FDPs, in actuality limited action was selected for the FDPs. The FDPs were to be enclosed within the fence that was to surround the areas being addressed and, although not clearly stated, were to be subject to the property restrictions that were to be imposed. Also, the area to be monitored for groundwater compliance was to include locations downgradient of FDP-5. See the Site-wide part of the Remedy Selection section below for further information on these restrictions.

#### **IV. Remedial Action**

##### **Remedy Selection**

The components of the remedy resulting from the 1994 Record of Decision and the 1997 Explanation of Significant Differences (ESD) are:

- **Groundwater.** Pumping of the reduction plant's Ranney well and the existing interceptor wells would continue in order to maintain a capture zone for the contaminated groundwater to prevent contaminants from migrating to the Ohio River or to the rolling mill property. Interceptor well water would be treated by ferrous salt precipitation and clarification or other means necessary to achieve standards set by the Ohio EPA National Pollutant Discharge Elimination System (NPDES) program before discharge to the Ohio River. The remedial goal for groundwater was restoration to drinking water quality, based on the fact that the aquifer was being used as a drinking water source. Therefore, groundwater cleanup standards were established that, when attained, would allow for potable uses of the groundwater; compliance with these cleanup standards must be attained throughout the plume. Groundwater would continue to be extracted and treated until the groundwater cleanup standards are attained.
- **Leachate.** Trench drains would be installed to intercept and extract all leachate seeping from the CMSD to prevent seep water from contaminating stream backwater sediments and river water. The leachate would be treated to meet NPDES discharge limits.
- **CMSD.** The CMSD would be recontoured and covered with a dual-barrier cap that would meet the requirements of Subtitle C of the Resource Conservation Recovery Act (RCRA). A Toxic Substance Control Act (TSCA) cell would be constructed within the CMSD.

- **Soils.** Residual soil contamination in the FSPSA would be treated by in-situ soil flushing. Contaminants would be flushed to the groundwater for ultimate capture and treatment by spraying the area with water that would dissolve the contaminants contained in the soil. The FSPSA was determined to be the primary contributor of fluoride and cyanide contamination to the underlying groundwater. The goal of the in situ soil flushing is to remove sufficient contaminants from the soils such that the soils no longer cause or contribute to exceedances of the groundwater cleanup standards in the underlying and downgradient groundwater. The ROD provided that during the design phase of the remedy a soil model acceptable to U. S. EPA would be used to develop Site-specific soil cleanup standards for the groundwater contaminants of concern for which groundwater cleanup standards had been established. These soil cleanup standards have not been developed as yet. Treatment of the FSPSA soils by soil flushing would continue until the soil cleanup standards are achieved and when all compliance points for groundwater in and downgradient of the FSPSA achieve the groundwater cleanup standards. Contaminated soils from the CRDA would be excavated and consolidated under the cover at the CMSD. Soils to be excavated from the trench drains would also be consolidated under the CMSD cap. Soils with PCB levels at or above 50 ppm would be placed in the TSCA cell.
- **Sediments.** PCB- and PAH-contaminated sediments would be removed by dredging in the outfall 4 stream backwater area. Sediments with PCB concentrations lower than 50 ppm would be stabilized and consolidated under the CMSD cap in the original decision and sediments with PCB concentration higher than 50 ppm were to be disposed of off-site. In the ESD it was decided to build a TSCA cell as part of the CMSD landfill and place all of the PCB-contaminated sediments in the cell.
- **Site-wide. Restrictions on Access and Use of the Site.** Access to the Site would be physically restricted by installation and maintenance of a 6-foot high chain link fence topped with 3 strands of barbed wire. Deed restrictions were to be established to prohibit use of groundwater for drinking water until cleanup standards are achieved and use of the Site for residential purposes.

Ohio EPA did not concur with the Proposed Plan because it felt that the plan was not protective enough. With the revised risk management scenario and associated limited-action component for the former disposal ponds in the ROD, the State did not concur with the selected remedy either.

The selected remedy is based on a clean-up of the soils to standards based on future commercial or industrial use of the property. The remediation goal for the groundwater is restoration to drinking water quality.

The ESD made two changes to the remedy. The TSCA protocols at the time allowed residuals up to 10 ppm PCBs if the soil was covered with a 10-inch layer of soil, and this was permitted for the remedy here; the ROD had specified excavation to 1 ppm PCBs. The other change allowed the construction of a TSCA compliant cell on the Site, as mentioned above. With this change, it was not necessary to haul soils with greater than 50 ppm PCBs to an off-site TSCA landfill; those soils with less than 50 ppm PCBs were also placed in the cell. The reason for the change was that it was found during the design that there were more soils with greater than 50 ppm PCBs than had

been thought.

### **Remedy Implementation**

A Consent Decree for remedial design and remedial action between Ormet Primary Aluminum Corporation and U. S. EPA was entered on December 18, 1995. Ohio EPA was not a party to this decree. The remedial design was approved April 15, 1997 following the issuance of the Explanation of Significant Differences on April 1, 1997. The remedial action is listed as beginning April 14, 1997.

The construction activities were separated into two discrete phases. The activities in the first phase were performed in March through April, 1997. In summary, these pre-construction activities consisted of:

- Preparation of the Health and Safety/Contingency Plan;
- Preparation of the Backwater Area Isolation Structure submittal; and
- Finalization of the Construction Quality Assurance Project Plan.

The second phase was carried out from May 1997 to June 1998. In summary, these construction activities consisted of:

- Site preparation;
- Removal of contaminated material from portions of the CRDA;
- Recontouring the CMSD;
- Installation of the CMSD seep collection and treatment system;
- Construction of the TSCA cell;
- Relocation of the outfall 004 discharge;
- Removal of contaminated sediment from the backwater area;
- Installation of the FSPSA soil flushing system and placement of a vegetative soil cover in the area;
- Construction of the Site fencing; and
- Site restoration.

The activities of both phases were performed in substantial accordance with the approved Final Design. There were some changes necessitated by field conditions; these changes were requested by Ormet and approved by U. S. EPA. Construction completion for the Site was reached on August 4, 1998, with the issuance of the Preliminary Close Out Report. Activities at the Site were consistent with the ROD and the ESD.

### **Institutional Controls**

Institutional controls (ICs) are non-engineered controls, such as administrative and legal requirements, that help to minimize the potential for exposure to contamination and that protect the integrity of the remedy. ICs are used to prevent exposure to contaminants remaining in soils or groundwater during and following implementation of the remedy at a Site if such residual contamination is at levels that are not protective for unrestricted use. Pursuant to the ROD and the 1995 Consent Decree, on January 10, 1996, Ormet Primary Aluminum Corporation recorded a Notice of Obligation to Provide Access and Related Covenants with the Monroe County

Auditor in the chain of title for the Site. The restrictions covered the approximately 47 acres of property that had been identified and described (by legal description) in the Consent Decree as the Ormet Superfund Site. The recorded document stated that the deed restrictions were intended to run with the land. The restrictions applied to the Site property only and consisted of: 1) prohibition on use of groundwater that would entail ingestion or dermal contact until groundwater cleanup standards are achieved, but specifically permitted pumping and use of groundwater for industrial purposes; 2) no use or activities on the property that might interfere with the response activities being performed pursuant to the Consent Decree unless prior written approval from EPA is obtained; 3) no residential use of the property; and (4) no excavation, installation, construction, removal or use of any buildings, wells, pipes, roads, ditches or other structures at the Site except with the express prior written approval by U. S. EPA.

U. S. EPA believes that these recorded restrictive covenants are protective in the short term, because they minimize exposure to contaminants on and under the Site itself and because Ormet obtains potable water for its employees from a public water supply and pumps ground water from the Ranney well solely for use as non-contact cooling water. However, the recorded restrictive covenants do not cover the non-Site portion of the reduction plant property. The contaminated groundwater plume currently extends beyond the Site boundary onto the non-Site portion of the facility. In the event Ormet transferred ownership of the reduction plant property, the current IC would not prohibit the new owner, or subsequent owners, from constructing drinking water wells on the non-Site property or pumping water from the existing Ranney well for potable uses. In addition, the non-Site portion of the reduction plant property contains numerous groundwater monitoring wells established to monitor the progress of cleanup of the groundwater plume and effectiveness of the remedy in preventing migration of groundwater contaminants beyond the facility boundary. Should the property be sold, future owners should be restricted from interfering with the operation and maintenance of those wells.

In April 2007, U. S. EPA discussed its concerns about the long-term effectiveness of the existing deed restriction with Ormet. Ormet and U. S. EPA agreed that Ormet would replace the Notice of Obligation to Provide Access and Related Covenants recorded in 1996 with an environmental covenant pursuant to Ohio's Uniform Environmental Covenants Act (UECA), Ohio Revised Code §§ 5301.80 to 5301.92. The Ohio UECA was enacted in 2004, and provides a statutory mechanism for establishing activity and use restrictions on property which is the site of an "environmental response project" conducted under a federal or state environmental remediation program, including the Superfund program. The new UECA covenant will cover the entire reduction plant property. Restrictions on potable use of groundwater and prohibitions on interference with operation and maintenance of the remedy will be extended to the non-Site portion of the facility to ensure that the remedy remains protective and effective in the event of any future changes in facility ownership or operation. The operation and maintenance plan will be updated to include monitoring and maintenance of the ICs.

### **System Operations and Operation and Maintenance**

There was a round of sampling of monitoring wells performed in May 1997 to provide a baseline characterization of groundwater conditions prior to the beginning of remedial activities. Routine sampling of the wells began in May 1998. Sampling is done three times a year (generally in Jan-

uary, May, and September). Some wells are sampled at each event, some wells are only sampled annually (in May), and a few wells are not sampled. Water levels are measured in almost all of the wells at each event. Prior to the first five-year review, the wells that were sampled at each event were 10 wells that are within and downgradient or approximately downgradient of the FSPSA and 1 well that is immediately downgradient of the CMSD; these wells had been identified as the points of compliance (MW-32, MW-35, MW-36, and MW-37 within the FSPSA; MW-16, MW-18, MW-28, and MW-31 at the downgradient edge of the FSPSA; MW-2 in the near plant area approximately downgradient of the FSPSA; MW-5 in the mid-plant area near the center of the plume from the FSPSA; and MW-12, downgradient of the CMSD). See Figure 1 which shows the monitoring well locations. These continue to be points of compliance. Samples from the wells are analyzed for the substances for which clean-up standards were set (see Table 1), except that samples from only 5 wells are analyzed for tetrachloroethene (one of these wells is one that is sampled only once a year), and for pH, specific conductance, and sodium, which are indicators of the plume. Beginning in May 2002, wells MW-44S and MW-44D, located immediately downgradient of the CMSD, were added to the wells being sampled at each event and are considered to be points of compliance. These wells are only sampled for PCBs; well MW-12 is also sampled for PCBs, beginning in May 2002. There are 21 other wells that are sampled only once each year; three of these wells (wells MW-7, MW-19, and MW-41) are considered background wells.

The interceptor wells and their groundwater treatment system have been operating since about 1972. These wells, along with the reduction plant's Ranney well, control the direction of the groundwater flow at the Site. A pre-treatment system was installed during the remedial construction to pre-treat any leachate collected from the seeps at the CMSD landfill and any leachate collected from the TSCA cell within it. The water discharge from this pre-treatment system goes to the groundwater treatment system.

A soil flushing system was installed in the FSPSA as part of the remedy. Its purpose is to remove the contaminants, mostly fluoride and cyanide, still within the soil and transfer them to the groundwater. These contaminants are then picked up by the interceptor wells. The flushing system is turned off during the coldest months of the year (typically from November through March). Two supplementary components were added to the original flushing system after the initial construction to enhance its performance. After heavy rains, surface water was observed to frequently pond in the southern portion of the FSPSA. In order to minimize this ponding and thereby deliver additional water to the subsurface, a series of shallow infiltration trenches were installed in the regraded FSPSA material. The infiltration trenches were installed to an approximate depth of 1.5 feet. The second improvement involved adding a shallow sump equipped with a small pump to the southern part of the FSPSA that was susceptible to ponding. The pump sends the water from the sump to the northernmost portion of the FSPSA where the water is discharged to the surface via a spray-hose. The flushing system was operated on a trial basis from August 1998 through October 1998, with flushing being done for about 3 hr per day. Beginning in April 1999, full operation began, flushing for 8 hr per day. In 2001, to reduce ponding that had been occurring, the operation was modified; the system continuously cycles, on for about 1.5 hr and off for 0.75 hours, for a total of about 14 hr per day. Ohio EPA reports that they still believe there is too much ponding in the area and that Ormet needs to improve the operation.

Maintenance also includes periodic inspections of the various components of the remedy and repairs when needed. The results of these inspections are reported to U. S. EPA annually. U. S. EPA has no cost information regarding operation and maintenance.

## **V. Progress Since the Last Five-Year Review**

The past five years have been uneventful except for the partial failure of the cover on the river side of the CMSD. This occurred in June 2006 and is discussed later in this section.

The water levels in the wells show that the water table under much of the Site is below the water level in the Ohio River. Thus, water is flowing from the river into the aquifer, which prevents the contamination in the aquifer from passing into the river. This direction of flow is caused by the pumping influence of the interceptor wells and the reduction plant's Ranney well. Water level plots also indicate that the operation of the soil flushing system at the FSPSA has no discernable effect on the groundwater flow patterns in that area. Plots of the concentrations of fluoride, total cyanide, and amenable cyanide show the contaminated plume extending from the FSPSA area down to the interceptor wells. Well MW-5 is near the center of the plume and about 1000 ft upstream of the interceptor wells. The concentrations of fluoride and amenable cyanide are above the clean-up levels in the vicinity of well MW-5.

Groundwater monitoring has been carried out in accordance with the *Remedial Action Groundwater Monitoring Plan*, Revision 1, April 28, 1997. The two substances in the groundwater that are of most interest are cyanide and fluoride.

Cyanide amenable to chlorination, to which the MCL applies, is that portion of the total cyanide that is weakly bound in cyanide complexes or is in the form of free cyanide. It is more reactive and more toxic than the metal-cyanide complexes. The analysis for amenable cyanide is generally only performed when the total cyanide concentration exceeds the MCL, which is the clean-up level here. The cyanide occurring in the groundwater at the Ormet facility appears to be predominately the stable cyanide complexes. It is to be noted that analysis for amenable cyanide tends to be subject to a greater degree of variability than analyses for other plume indicators, such as total cyanide and fluoride. At two of the compliance wells, the most recent total or amenable cyanide concentrations were below the clean-up goal; at MW-12 the total cyanide has been below the detection limit while amenable cyanide at MW-28 has been below the MCL since May 2002 except for one measurement. In most of the wells the concentrations of amenable cyanide fluctuate so much that a trend cannot be determined. In wells MW-16, MW-31, MW-36, and MW-37 the total cyanide appears to be holding fairly steady. In May 2005 there were significant increases in the total cyanide concentrations in several wells along the western edge of FDP-5. The increases occurred in wells MW-15, -34S, -34D, -17, and -39D. There was an increase in MW-39S in May 2004, and the concentration decreased only slightly in May 2005. There was no significant increase in well MW-14 in May 2005. The concentrations in these wells will be followed closely over the next few years. It is not known at this time whether the significant increases are from the soil flushing or whether FDP-5 is contributing to the increases.

As indicated above, fluoride is potentially a more reliable indicator of changes in plume quality. Fluoride concentrations have been below the clean-up goal in two of the compliance wells, MW-

12 and MW-28, for a number of years. The PRP's contractor reported that there was a downward trend in the concentrations in seven of the other compliance wells and an increasing trend in well MW-32; the increasing trend in MW-32 is probably due to the flushing of the soil in the FSPSA. In three compliance wells, including the two where the concentrations are below the clean-up level, no trend has been established. There has also been an increase in fluoride concentrations either in May 2005 alone or in the previous year or two in the wells along the western edge of FDP-5 listed above for cyanide; again, there was no increase in well MW-14. Figure 2 shows the fluoride isopleth map for the data from May 2005. The isopleth map for total cyanide is similar. This shows the plume that extends from the area of the FSPSA toward the interceptor wells.

Arsenic concentrations in three of the compliance wells in the May 2005 sampling were below the clean-up goal, which happens to be the new MCL (10 µg/l); the concentrations in two of these wells have been below the detection limit. In six of the compliance wells a decreasing trend is reported by the PRP's contractor. Three compliance wells have no consistent trends. Ormet has proposed that the background level for arsenic, and hence the clean-up goal, should be 40 µg/l, the highest concentration found in the wells that were proposed as being background wells. The Agency has not accepted this level.

Beryllium concentrations have generally been below the clean-up level, as have vanadium concentrations. Tetrachloroethene (tetrachlorethylene) (PCE) is analyzed for in the five wells where it was detected during the RI. It is above the clean-up level in four of the five wells being sampled.

Manganese concentrations have reportedly been increasing recently in three compliance wells (MW-28, MW-31, and MW-32), decreasing in four wells (MW-5, MW-16, MW-36, and MW-37), and showing no consistent trend in the remaining four compliance wells. Ormet has proposed that the background level for manganese, and hence the clean-up goal, should be 9780 µg/l, the highest concentration found in the wells that were proposed as being background wells. The Agency has not accepted this level. It is to be noted that the secondary maximum contaminant level (SMCL) for manganese is 50 µg/l and the tentative clean-up level set in the ROD is 230 µg/l, which was identified as a background value during the RI. The manganese concentrations will be evaluated in the future. More data over time for the manganese concentrations will lead to a better understanding of the trends and what might be a reasonable clean-up level. In the meantime the clean-up level identified in the ROD will be used.

After the last five-year review, the PRP began sampling three wells that are downgradient of the CMSD for PCBs. (PCB contaminated materials were buried in the CMSD during the remediation.) No PCBs have been detected since the last five-year review..

For the period from May 2001 to May 2004, Ormet's contractor reported that the estimated fluoride mass-in-place in the aquifer increased to 38,800 lb, from an estimated 21,700 lb. In 2005, the estimated fluoride mass-in-place decreased slightly to about 37,700 lb. Note that full time soil flushing began in 1999. During the period from June 1988 through May 1998, the mass of fluoride had declined from about 85,700 lb to about 24,000 lb. The increase that has occurred since May 2001 indicates that the soil flushing is working, transferring fluoride from the soil to the groundwater.

Similar to what is happening with fluoride, the estimated cyanide mass-in-place decreased from over 6,800 lb in 1988 to about 2,400 lb in 1998. In 1999, the estimated cyanide increased to nearly 5,600 lb. Between 1999 and 2003, the cyanide mass-in-place decreased. In 2004, the estimated cyanide mass-in-place was 3,100 lb and in 2005 it was 4700 lb.

The PRP's contractor has reported that between May 2004 and May 2005, approximately 8,800 lb of fluoride and approximately 1,070 lb of total cyanide were removed from the alluvial aquifer by the interceptor wells and the reduction plant's Ranney well. During the same time period, the estimated mass of fluoride in the aquifer decreased by approximately 1,180 lb and the estimated mass of cyanide increased by approximately 1,620 lb. Because of the variability of several factors, long-term trends are more significant than year to year changes. The data for cyanide indicate an overall trend of decreasing mass-in-place, but the data for fluoride are less consistent.

The PRP's contractor also estimated the areas of the aquifer that are above the clean-up goals for both fluoride and total cyanide. From May 2004 to May 2005, the area for fluoride decreased from 42.1 acres to 39.5 acres. For cyanide the area increased from 38.1 acres to 43.7 acres although the area had held fairly steady for the previous four years.

The flow patterns determined from the water level measurements in the wells show that the water removed by the interceptor wells and the reduction plant's Ranney well continue to contain the plume. These wells continue to remove contaminants from the aquifer which are then removed from the water in the treatment plant to levels that meet the acceptable discharge levels, as has been done since about 1972. The soil flushing system appears to be accomplishing its intended purpose, transferring contaminants from the soil in the soil flushing area to the groundwater. The interceptor wells appear to accomplish their intended purpose, transferring contaminants from the groundwater to the treatment system and containing the plume. Ohio EPA has proposed that additional extraction wells be placed in the area of the FSPSA to improve the removal of cyanide and fluoride from the groundwater and to possibly increase the efficiency of the treatment system and reduce the time it will take to clean up the aquifer. This is something that will be considered in the future.

A review of the operation and maintenance reports indicates that there have been few problems with the Site. Ormet has adjusted the method of operation for soil flushing to prevent ponding of water in the low spot, although some still exists; there would appear to be no advantage to applying excess water to the area.

On June 12, 2006, the PRP reported to U. S. EPA that there was a partial failure of the cover on the CMSD. This occurred on the side of this landfill that faces the river. A section, reportedly about 20 ft wide at the top and 40 ft wide at the bottom that extended approximately 100 ft down the slope, had slid down the membrane cover or some of the material on top of the membrane. Adjacent to this area, to the west, there was also some minor movement of the cover that resulted in the formation of a gully and some other cracks. In none of the places did the opening of the cover extend beyond the membrane that is part of the cover so that none of the wastes were exposed. The material sliding down the hill damaged the fence that is near the toe of the landfill. Temporary repairs were made by the PRP late in August. The cracks were filled in and

revegetated. The main failed area was covered with plastic sheeting. Late in October, the main failure was covered with another temporary cover that provided some ultraviolet protection.

On March 14, 2007, Ormet issued a report from its contractor on the investigation of the failure, the specifications for the repair, and future monitoring and maintenance. This report had been available in draft form two or three months earlier. The contractor attributed the failure to positive pore pressure having developed in the drainage layer (geonet) which resulted in small displacements that resulted in cracks in the vegetative support layer covering the drainage layer. The initial positive pressure was due to the drainage layer not being able to adequately drain moisture away. The repair is designed to ensure that the drainage layer maintains sufficient discharge capacity. The original construction of the cover called for a toe drain, a pipe at the bottom of the drainage layer. It is still not known if this is in place. This will be determined during the repair of the failure this spring or early summer.

The protectiveness statement in the April 2002 five-year review report stated:

The remedy is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled and institutional controls are preventing exposure to, or the ingestion of, contaminated groundwater. The PRP is still operating the manufacturing facility which also contributes to decreased opportunities for exposure and this supplements the institutional controls. Threats at the site have been addressed through capping, excavation, soil flushing, plume containment, groundwater pump-and-treat, installation of fencing, and the implementation of institutional controls.

Long-term protectiveness of the remedial action will be verified by obtaining additional groundwater samples to maintain a record of the groundwater contamination. Current monitoring data indicate that the remedy is functioning as required to achieve clean-up goals.

The following are the recommendations that were made in that review followed by comments on what has taken place since then.

- The vegetation on the landfill cover needed to be improved. *Improvement in the maintenance of the vegetation is still needed.*
- An additional well, well MW-14, downgradient of FDP-5, needed to be added to the monitoring program and another monitoring well should be sampled three times per year instead of annually. *Well MW-14 was added to the monitoring program and sampled annually but the frequency of sampling well MW-39S was not increased; based on the results over the past five years it was not necessary to increase the frequency of sampling. The concentrations of amenable cyanide and of fluoride in well MW-14 are consistently below the clean-up standards and are significantly below the concentrations in the wells west of FDP-5 that are in the FSPSA, except for well MW-39D which has concentrations that are closer in magnitude to those in well MW-14. The concentrations of fluoride in well MW-39S have been significantly above the clean-up standard and have increased recently, but those in well MW-39D have been near the clean-up standard, with some increase recently. The concentrations of amenable cyanide have been fluctuating in well MW-39S, generally exceeding the clean-up standard, but those in well MW-39D have been consistently below the clean-up standard.*
- Two wells need to be added to the monitoring program for the determination of PCBs downgradient of the CMSD landfill area twice a year. *Since the last review, three wells*

*have been sampled for PCBs, generally three times per year, and none have been detected.*

- Background values in the aquifer for manganese and arsenic must be determined based on a methodology approved by USEPA. *This has still to be done, to determine if the clean-up standards for these two substances should be any greater than what was listed in the ROD.*
- U. S. EPA will continue to follow the information available on the FDPs and the groundwater downgradient of them. *This is an ongoing task to determine if the FDPs may be contributing contamination to the groundwater that may significantly delay the completion of the groundwater cleanup.*

## **VI. Five-Year Review Process**

### **Administrative Components**

Ohio EPA's Site Coordinator, Michael Sherron, was notified on November 6, 2006, by U. S. EPA's Remedial Project Manager, Bernard Schorle, who is conducting the review, that the review was to take place. The PRP's representative was formally notified of the upcoming review on the same date.

### **Community Notification and Involvement**

A notice appeared in the Monroe County Beacon that ran during the week of February 1, 2007. The notice informed the public that a review was to take place, listed the major components of the remedy, and said where additional documents could be found. The public was also told that they could submit comments concerning the Site to U. S. EPA. See Figure 3.

The Site has not generated much interest from the local community in the recent past and there were no comments submitted from the community for this review. No interviews were conducted with any local community members not directly connected with the Site.

A second advertisement announcing the completion of the five-year review and the availability of the report once the report is signed will be placed.

### **Document Review**

For the review itself, the annual reports from the PRP covering groundwater monitoring and operation and maintenance were reviewed. The most recent of these reports were received in the first half of 2006. The groundwater monitoring report covered the results of the monitoring through October 2005 and it included a table presenting the results for the groundwater monitoring for the wells being monitored that includes data from as far back as late 1983.

In addition, the reports from a contractor for the PRP, both draft and final, concerning the possible cause of the failure of the CMSD cover and what should be done to repair it, both for the interim and for the final repairs, have been reviewed. Pictures of the failed area that were provided by the state were also reviewed.

The groundwater clean-up standards have been presented in Table 1. It is to be noted that the standard for manganese is subject to review. It is generally not required that a substance be cleaned up to a concentration below the background level, and the background level for manganese has not yet been established. There possibly may be some adjustment in the arsenic clean-up level also, if it is determined that the background level is above the clean-up level given in Table 1.

## **Data Review**

Ormet annually submits the results of the monitoring program that was described above; this report includes its summary of what the data are indicating. Ormet also annually submits a report on its inspections of various remedial components and what has had to be repaired. Ohio EPA conducts periodic inspections of the facility and reports its observations to U. S. EPA. These are all reviewed by U. S. EPA. The past few months, U. S. EPA has also had to follow the progress in analyzing the partial failure of the cover on the CMSD and review the suggested repair of the cover. The results of these reviews are described in various sections above.

## **Site Inspection**

Inspection of the Site was conducted on November 8, 2006, by the RPM, the state's Site Coordinator, and a representative of the state's Geotechnical Resource Group who had been consulting for the state on the CMSD cover failure. The purpose of the inspection was to observe the Site, especially the CMSD, and check on those things that are not generally reported on. Except for the CMSD cover, the Site appeared to be in very good condition. Besides the cover failure at the CMSD, the vegetation on the cover is still somewhat sparse in some areas, especially on the relatively flat top, and in some areas on the slope on the river side there is some vegetation that needs to be cut back or removed.

The institutional controls have been discussed previously in Part IV. No violations of the restrictions were observed. With Ormet still operating the facility, it is expected that there would be no problems with violations at this time.

The Site was discussed with Ormet's representative. As mentioned before, no discussions were engaged in with any local people that do not have a direct connection with the Site.

## **VII. Technical Assessment**

### Question A. Is the remedy functioning as intended by the decision documents?

Yes.

The review of the available information indicates that the remedy is functioning as it was intended. The soil flushing going on in the FSPSA appears to be doing its job, moving contaminants into the groundwater, and the PRP has adjusted the operation of the system to the realities of the area. However, Ohio EPA is still concerned about the ponding that occurs in the FSPSA. U. S. EPA has no information on the costs of operation and maintenance.

As discussed previously, the ICs will be changed to conform to what was intended by the requirements in the ROD and to obtain restrictions that will be effective in the long term.

Question B. Are the exposure assumptions, toxicity data, clean-up levels, and remedial action objectives used at the time of the remedy selection still valid?

Yes.

There have been no major changes in the physical conditions of the Site that would affect the protectiveness of the remedy. The CMSD cover failure did not expose anyone to the wastes buried there. The Site is being used as anticipated so the exposure assumptions that were made do not need to be changed.

Most of the applicable or relevant and appropriate requirements (ARARs) that have been discussed in the decision documents dealt with the construction of the remedy and are no longer a concern, except for the requirement that a landfill cover have an acceptable vegetative cover. The remaining ARARs that still have to be attained deal with the quality of the groundwater. There has been a change in one of the requirements under these ARARs; the MCL for arsenic has been changed from 50 µg/l to 10 µg/l. At this Site, this change may be a moot point since the ROD set the clean-up level for arsenic at 10 µg/l, based on that being the analytical quantitation limit at the time and being greater than the background level. The background level for arsenic still needs to be established, as does the background level for manganese. It is not necessary to establish these at this time or in the near future since decisions that will make use of these background levels will not be made in the near future.

Question C. Has any other information come to light that could call into question the protectiveness of the remedy?

No.

There has been no new information that would make one think that the remedy selected is not protective. Ohio EPA continues to express its concern about the FDPs, believing that a further evaluation of the FDPs needs to be conducted. The groundwater data does show that there are fluorides and other substances probably entering the groundwater from the FDPs, and some of the concentrations downgradient of the FDPs have increased within the last few years, but it is U. S. EPA's belief that these changes do not warrant revisiting, at this time, the decision that was made for the ROD, which was that the FDPs did not require active remedial action. The increases downgradient of the FDPs also may have increases due to the soil flushing. The substances leaving the FDPs are being removed by the interceptor wells. Also, the recognition that restrictions have not been placed on the use of groundwater under the Ormet plant proper does not affect the protectiveness of the remedy so long as Ormet owns the facility. The ICs can be expanded to prohibit future owners/occupiers from consuming the groundwater or interfering with the operation and maintenance of the remedy.

## Technical Assessment Summary

According to the data reviewed, the Site inspection, and discussions with the state's Site Coordinator and Ormet's representative, the remedy is functioning as intended by the ROD as amended by the ESD. There have been no changes in the physical conditions at the Site that would affect the protectiveness of the remedy. The only change in ARARs that was found that might affect the clean-up standards in the groundwater is the change in the MCL for arsenic from 50 µg/l to 10 µg/l, but the clean-up standard for arsenic had already been set at 10 µg/l. The other clean-up standards, except that for manganese, are set at the MCLs or proposed MCLs. The clean-up standard for manganese is to be revisited; the background level must be determined, and it is likely that the background level will be the clean-up standard.

Although there is some variability in the concentrations of the chemicals of concern, with upward, downward, and no trends being observed, this is not unusual. Certain of these chemicals (arsenic and manganese) are affected by the redox properties of these aqueous solutions, and this can cause concentrations to fluctuate. The observed variability in the concentrations does not call into question the protectiveness of the remedy.

## **VIII. Issues**

1. The CMSD landfill cover needs to be repaired and its maintenance needs to be improved.
2. The fluoride concentrations in the plume near FDP-5 have increased recently.
3. The existing deed restriction covers only the Site property. It does not limit exposure to the contaminated groundwater located under the manufacturing portion of the facility or protect remedy components located on that portion of the facility.

## **IX. Recommendations and Follow-Up Actions**

1. The repair of the failed portion of the CMSD landfill cover is scheduled for this spring or early summer. The procedures for the maintenance of the cover that have been included in the specifications for the cover repair developed by Ormet's contractor need to be implemented.
2. The results from the groundwater monitoring downgradient from FDP-5 will continue to be followed closely to see what effect FDP-5 might be having on the groundwater contamination.
3. An IC Plan will be developed providing milestone dates for implementing a new UECA environmental covenant covering the entire Hannibal reduction facility.

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Mile- stone Date	Affects Protectiveness? (Y/N)	
					Current	Future
CMSD cover needs to be repaired and its maintenance needs to be improved.	Repair has been proposed. It is expected to be implemented by early summer. Maintenance procedures have been proposed.	PRP	U. S. EPA	Sept. 2007 for repair; maintenance is on-going	N	Y
Fluoride down-gradient of FDP-5 increased	The concentrations need to be tracked	PRP	U. S. EPA	On-going	N	Y
ICs-- effectiveness and completeness	Change the form of the ICs and place some restrictions on the rest of the reduction plant	PRP/U. S. EPA	U. S. EPA	October 2007	N	Y

## **X. Protectiveness Statement**

The remedy is protective of human health and the environment in the short term. Exposure pathways that could result in unacceptable risks are being controlled and deed restrictions, in conjunction with the continued operation by Ormet of the reduction plant, are currently preventing exposure to, or the ingestion of, contaminated groundwater. Threats at the Site have been addressed through capping, excavation, soil flushing, plume containment, groundwater pump-and-treat, installation of fencing, and the implementation of institutional controls. The remedy will be protective in the long term once effective institutional controls preventing potable use of contaminated groundwater have been expanded to cover the entire reduction plant property.

## **XI. Next Review**

The next five-year review for the Ormet Corp. Site is required in May 2012, five years from the date of this review.

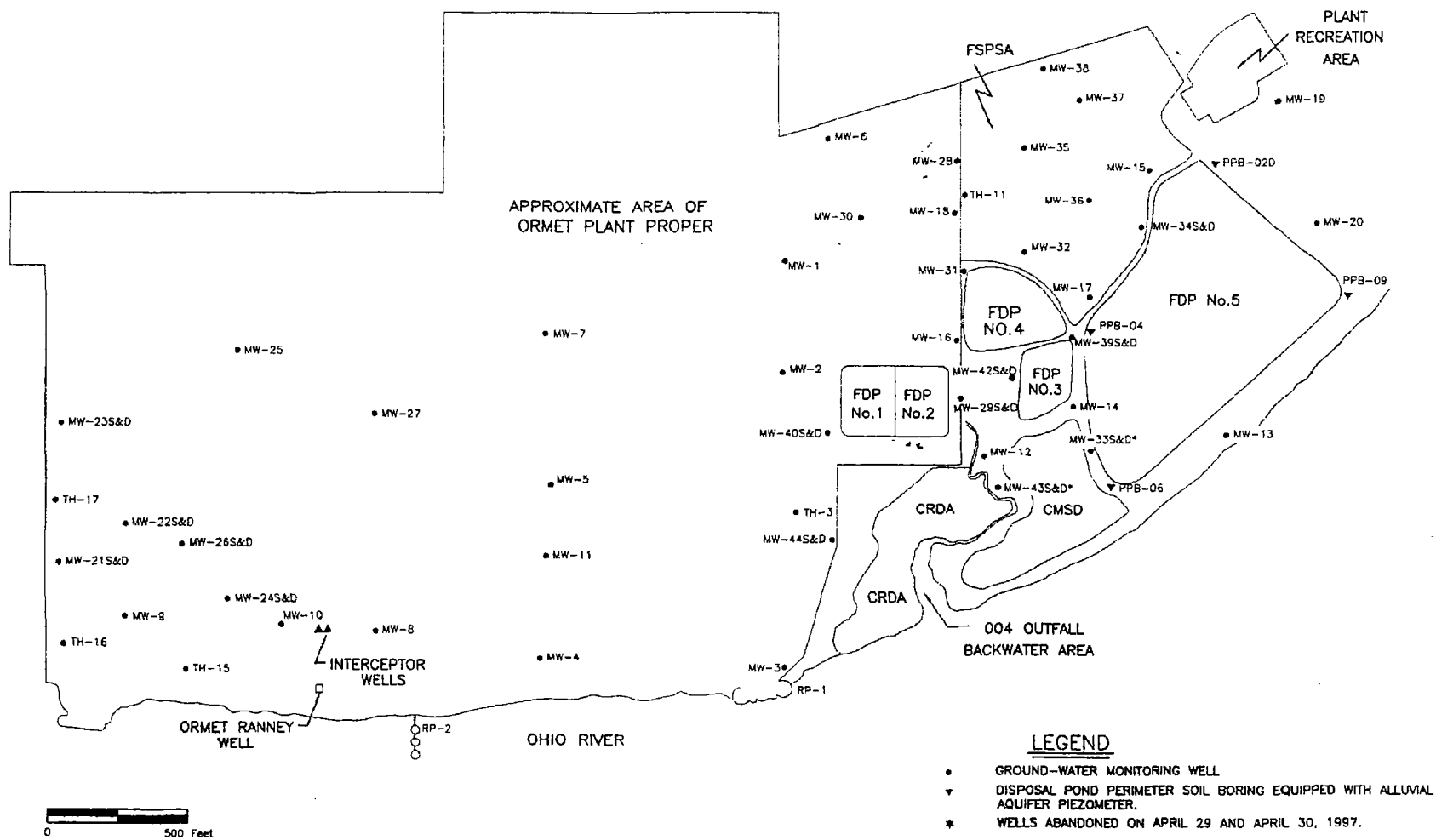


Figure 1. Base Map, Ormet Corp., Reduction Plant, Hannibal, Ohio  
(Obtained from map produced by HydroSystems Management, Inc.)

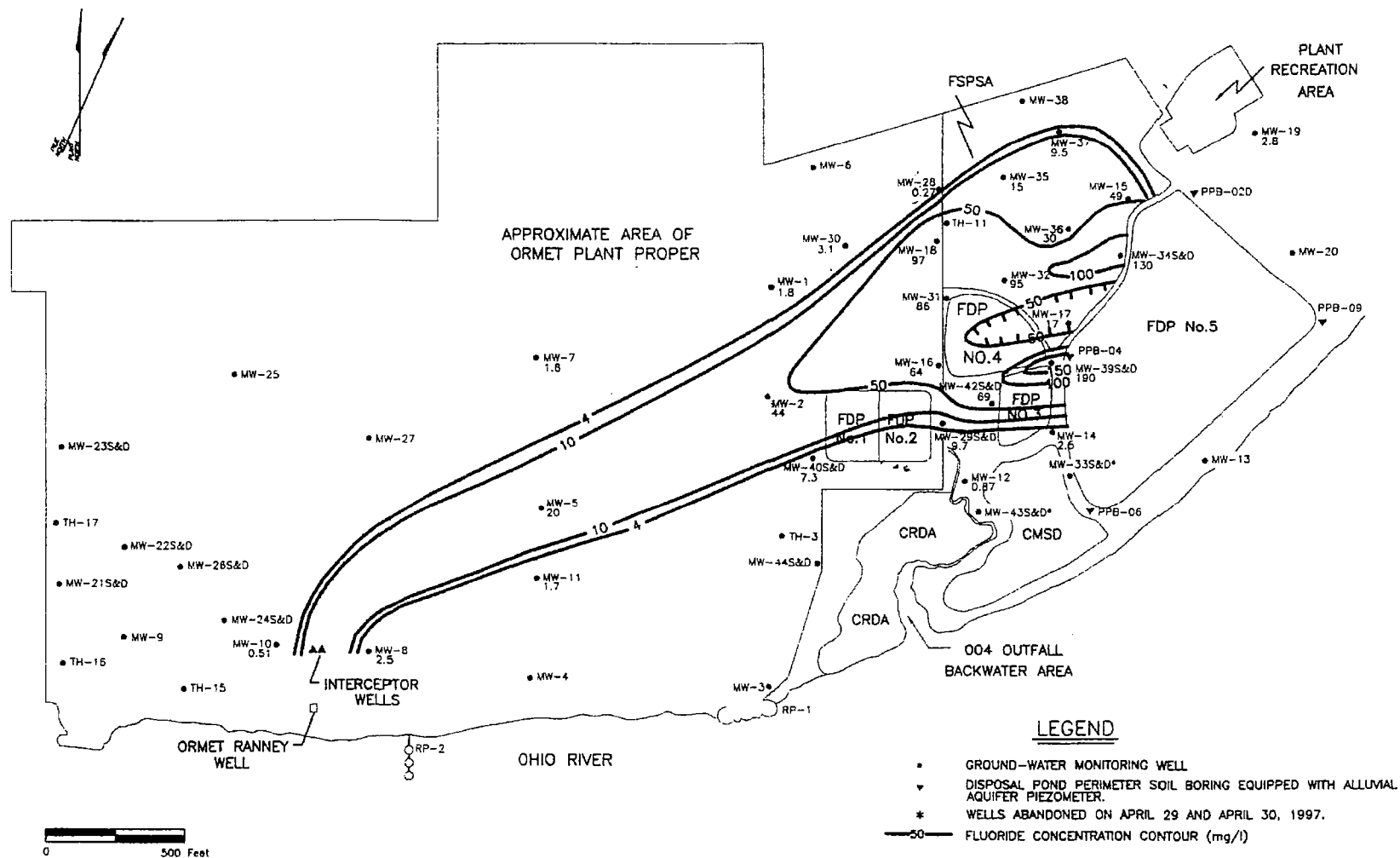


Figure 2. Fluoride Isopleth Map, Ormet Corp., Reduction Plant, Hannibal, Ohio, May 16-19, 2005  
(Obtained from map produced by HydroSystems Management, Inc.)

Figure 3. Notice that appeared in the *Monroe County Beacon* for one week on or after February 1, 2007.

**EPA to Review Ormet Corp. Superfund Site  
Monroe County, Ohio  
Comments Invited**

U.S. Environmental Protection Agency has begun a five-year review of the Ormet Corp. Superfund site located on SR 7 in Monroe County, Ohio. The federal Superfund law requires a review at least every five years at sites where the cleanup has been started but hazardous wastes remain on-site. The agency conducts the review to make sure the cleanup still protects human health and the environment. This is the second such review since work on the cleanup systems was largely completed in 1998.

The main cleanup work followed a 1997 record of decision, but intercepting contaminated ground water (underground water supplies) began about 1972. Cyanide, fluoride and polychlorinated biphenyls (PCBs) are the contaminants of most concern at the site. The cleanup plan for the site included:

- continued operation of the interceptor wells and treatment system for the removal of contaminated groundwater;
- the continued pumping of the Ranney well to remove contaminants from a mass (plume) of underground water;
- soil flushing of the former spent potliner storage area;
- construction of a landfill and a Toxic Substance Control Act (TSCA) cell at the construction materials scrap dump;
- removal of contaminated soil and sediment (mud) and disposal of them in the scrap dump and TSCA cell; and
- fencing, operation and maintenance of the cleanup systems, monitoring and institutional controls.

During the review, EPA will inspect the site, will study ground-water monitoring results and will review the institutional controls. EPA will release its findings next spring in a report that will be announced in the newspaper. Information about the site is available for review at the site repository at the Monroe County Public Library, 96 Home Ave., Woodsfield, Ohio, and the New Martinsville Public Library, 160 Washington St., New Martinsville, W. Va. A copy of the 2002 five-year review report is available on the Internet at

[www.epa.gov/R5Super/fiveyear/fyr\\_index.html#Ohio](http://www.epa.gov/R5Super/fiveyear/fyr_index.html#Ohio). EPA invites you to provide information that might be important in this site review by contacting Bernard Schorle, Remedial Project Manager, EPA Region 5 (SR-6J), 77 W. Jackson Blvd., Chicago, IL 60604; (312) 886-4746 or (800) 621-8431, weekdays 9 a.m. - 4:30 p.m., [schorle.bernard@epa.gov](mailto:schorle.bernard@epa.gov). Your information will be most valuable to reviewers if received by the end of January, Feb. 1, 2007